
IMPLANTABLE DEVICE USING ULTRA-NANOCRYSTALLINE DIAMOND

Abstract

An implantable biocompatible device, that may be either a sensor or stimulator, having electronic circuitry and electrodes formed on a substrate, is uniformly covered with a coating approximately one-micron thick of ultra-nanocrystalline diamond, hermetically sealing the electronic circuitry. Selected electrodes are either left uncovered during coating or uncovered by conventional patterning techniques, allowing the electrodes to be exposed to living tissue and fluids. The ultra-nanocrystalline diamond coating may be doped to create electrically conductive electrodes. These approaches eliminate the need for a hermetically sealed lid or cover to protect hybrid electronic circuitry, and thus allow the device to be thinner than otherwise possible. The conformal ultra-nanocrystalline diamond coating uniformly covers the device, providing relief from sharp edges and producing a strong, uniformly thick hermetic coating around sharp edges and on high aspect-ratio parts.

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